

**Water Walkers Streamflow Monitoring, INC.**

9045 E Zebulon Cir, Parker CO 80134

[www.walking-water.net](http://www.walking-water.net)

**Indian River near Sitka, Alaska**

**Station Analysis – Water Year 2010**

**LOCATION:** From the intersection of Halibut Point road and Sawmill Creek road in Sitka, proceed southerly along Sawmill Creek road. Just prior to crossing Indian River, turn left onto gravel road. Proceed down this road about a mile to end and the trail head. Hike up the right bank of Indian River along this trail for about 1 mile (20 – 30 minutes) to gage site. The gage site is a reach where the trail is next to the river and very large boulders and bedrock are evident in the river.

**GAGE:** A druck 1830 submersible pressure transducer, a water temperature probe, and a recorder set to record stage at 15 minute intervals provided a good record of stage from December 4, 2009 to September 22, 2010. Period October 1, through December 3 gage shelter pipe was broken. Period September 23-30 data is unavailable at the time of this report. Records for these periods are considered poor. Gage was replaced December 3 and provided about ½ a days data. However, it was felt the mean for the last half of the day did not represent the mean discharge for the day so it was also estimated.

The recorder is housed in a small metal shelter mounted on top of a steel pipe bolted to a large boulder/bedrock outcrop. The gage is referenced to a set of RP/RM's with tape downs to the water surface. The primary reference is RP 100.

Recorder reliability and gage height corrections were checked 3 times during this period. The gage was installed December 3, 2009, and set to datum with no recorder correction. A visit on February 2, 2010 found a -0.06 recorder correction. Gage was again visited on June 24 and found a -0.01 recorder correction. And on September 22, a -0.03 recorder correction was found. All corrections were applied by proration between visits.

**WATER TEMPERATURE:** The water temperature probe was reestablished at the time that the gage was reinstalled on December 3, 2009, and provided a 15-minute record of water temperature. Water temperature at the probe was measured with a calibrated thermometer 3 times during the year finding corrections to the recorder of -1.0°F February 3, -3.1°F June 24, -- 1.0°F September 22.

Water temperature cross sections were run February 3, June 24, and September 22. Variation within individual cross sections ranged from 0.2°F to 0.4°F and mean temperatures varied from that at the sensor from 0.0°F to 0.2°F. See manuscript for actual values.

Period October 1, 2009 through December 3 is missing due to broken shelter pipe. Data for period September 23-30 was unavailable at the time of this report.

**DATUM:** Levels were run on June 24, 2010 by Water Walkers Streamflow Monitoring, Inc. RM-10 was used as base and found RM-13 0.008ft low from 2009 levels. RP-100 was found 0.021ft low. RM 11 and RM 12 were found destroyed (only the holes in rock left). Prior to gage installation in June 2007 levels were run by Water Walkers Streamflow Monitoring, Inc and the National Parks Service to reestablish references for gage datum. USGS gage datum was not found and arbitrary datum was used to establish RM's 10 – 13 and RP 100.

On August 17 2009 at about 7:00 AM during a period of high flows, the streamgage was severely damaged. At 4:21 AM a peak flow of 2,960ft<sup>3</sup>/s was recorded at the gage. When found October 1, gage pipe was broken in two at the pipe joint and top of pipe and transducer were laying in the gage pool. The transducer was still in the water and recording but subject to significant movement. The gage was reinstalled on December 3, 2009 by the Alaska Department of Fish and Game. Period October 1, 2009 through December 3 is estimated and considered poor.

**RATING:** Three discharge measurements (#510, #511, and #512) were made by the National Parks Service during the 2010 water year. Discharge measurements were made February 3, June 24, and September 22 and ranged from 29.4ft<sup>3</sup>/s to 37.6ft<sup>3</sup>/s and from 7.99 ft to 8.18 ft of stage. Rating 13.1 Lower and 13.2 were continued in use for the 2010 water year.

Discharge measurement 510 made February 3, plotted -31% from Rating 13.1 with an optimum shift of -0.19 ft. Measurement 511 made June 24, plotted -42% from Rating 13.1 with an optimum shift of -0.30 ft. Measurement 512 made September 22, plotted -36% from Rating 13.1 with an optimum shift of -0.22 ft. Discharge measurements for the 2010 water year were rated from good (+/- 5%) to fair (+/- 8%). Stage shift #1 was applied December 3 – February 3 @ 15:30. Shift #1 applied a -0.30 shift from the bottom of the rating up to 8.05 ft, and then prorated to a 0.00 shift at 9.85 ft. Shift #2 was applied February 3 @ 15:31 – March 23 @ 19:15. Shift #2 applied a -0.19 shift from 00 ft up to 8.05 ft, and then prorated to a 0.00 shift at 9.85 ft. Shift #3 was applied March 23 @ 15:16 – July 4 @ 18:00. Shift #4 applied a -0.29 shift from 00 ft up to 8.2 ft, and then prorated to a 0.00 shift at 9.85 ft. Shift #4 was applied July 4 @ 18:01 – September 30 and applied a -0.22 shift from 00 ft up to 8.00 ft and then prorated to a 0.00 shift at 10.80 ft.

**SPECIAL METHODS:** Data for October 1, 2009 through December 3 is missing due to damaged shelter pipe and was estimated. September 23-30 is also estimated as data was unavailable at the time of this report. Records were estimated based on National Weather Service temperature and precipitation records, hydrographic comparison with Indian River at Sitka gage, and trends of the hydrograph.

**REMARKS:** Records of discharge are considered good/fair except for the estimated days  
October 1 – December 3 and September 23- 30.

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**15087700 (USGS) Indian River at Sitka, Alaska**  
**Station Analysis – Water Year 2010**

**Location:**

From the town of Sitka Alaska, proceed southerly along Sawmill Creek road to bridge over Indian River. Park, and proceed up the right bank on foot about 500ft. to gage location. It may be the easiest to hike or walk upstream along the diversion pipeline (also above right bank) 500ft and then drop down onto the creek bank.

**Gage:**

A Druck 1830 submersible transducer, a water temperature probe, and a recorder set to record stage values at 15 minute intervals provided a good record of stage from October 1, 2009 to September 23, 2010. There was no ice affected record during this water year. The period September 24-30 had to be estimated as the records were not available at the time of this report.

The recorder is housed in a small metal shelter on top of a steel pipe bolted to large boulders/bedrock. The gage is referenced to a set of RP/RM's and tape downs to the water surface. The primary reference is RP-1 with a tape-down from RP-2 also as a check.

Recorder reliability and gage height corrections were checked 3 times during the 2010 water year. Gage was visited February 4, June 23, and September 23.. Corrections to the recorder were +0.33, +0.32, and +0.33 respectively. All corrections were prorated between visits.

**Water Temperature:**

Water temperature at the probe was checked with a calibrated thermometer 3 times during the 2010 water year. Visits checked water temperature on February 4, June 23, and September 23 with corrections to the recorder of -1.0°F, -4.0°F, and -0.8°F respectively. All corrections were prorated between visits. Temperature cross sections were run February 4, June 23, and September 23 with no variation within each cross section. There was no difference in temperature between the mean cross-section and that at the temperature probe on February 4 and June 23. On September 23 the mean in cross section was 0.2°F cooler than that at the probe.

See water temperature evaluation and water temperature manuscript for cross-section information.

**Datum:**

Levels were run June 23, 2010 by the National Park Service and Water Walkers.

RM-3 was used as base RM and found that compared to last levels of 5/27/09, RP-1 was 0.006 higher, RP-2 0.005 lower, and RM-4 0.017 higher. The leveled present water surface matched exactly the tape-down from RP-1.

Each visit in 2010 had tape downs from both Rp-1 and RP-2 to help verify gage height.

**Rating:**

Three discharge measurements were made by the National Parks Service during the 2010 water year. Measurements were made February 4, June 23, and September 23. Measured discharges varied from a low of 14.3 ft<sup>3</sup>/s to 40.0ft<sup>3</sup>/s and gage heights ranging from 20.89ft to 21.20ft.

Rating 3.0 is the same as Rating 2.0 above 22.50ft of stage. Rating 3.0 was put into effect October 1, 2007 and was applied for the entire 2010 water year. Discharge measurement #109 (02/04/10) plotted +9.4% from Rating 3 with an optimum shift of +0.03; measurement #110 (06/23/10) plotted +2.0% with an optimum shift of +0.01; #111 (09/23/10) plotted -18.3% with an optimum shift of -0.06.

The optimum shifts that vary from a +0.03ft to a -0.06 ft indicate a shifting control condition. The control is unstable and fills with deposition as indicated by the negative shifts, and then scours with the positive shifts. Shifts were applied to compensate for these conditions using stage – shift curves indicated by the discharge measurements.

Shift Curve #1 was developed based on discharge measurements 108 (7/28/09) the last measurement of the 2009 water year, 109 (02/04/10) and 110 (6/23/10). Curve #1 shows a slight (0.02ft) scour of the control. It was applied October 1, 2009 to July 4, 2010 and has a +0.02 shift up to 21.20ft stage, then rejoins the rating at 22.6ft.

Shift curve #2 was developed based on discharge measurement #111 (09/23/10) the last measurement of the 2010 water year. Curve #2 indicates a 0.06ft fill on the control following the July 4 high water and was applied July 4 – September 30. Curve consists of a -0.06ft shift up to 21.0ft then joins the rating at 22.60ft.

All discharge measurements plotted within 3.7% of Rating 3 after shifting.

**Special Methods:**

Daily values for period of missing record, September 24-30, was estimated based on National Weather Service weather records, hydrographic trends during similar weather events and trends of upstream station Indian River near Sitka. Periods of ice affect were looked for using water temperature records, rainfall events and air temperature records for Sitka. No ice affected record was found.

There was an odd looking spike in the hydrograph for March 6 but did not appear to be ice affected record as there was little or no rain that day, water temperature was several degrees above freezing, air temp did not look low enough and the upstream station recorded the same spike. It may have been a snow/ice dam failure upstream or on an upstream tributary.

**Remarks:**

Records of discharge considered fair except for those estimated daily discharges which are poor. The lower flows were documented by three good – fair discharge measurements and no

problematic recorder corrections. Flows above 200ft<sup>3</sup>/s were downgraded to fair since we have no validation for the upper end of the rating and are relying on the shape of an older rating curve. Mean monthly flows for November set a new high for the period of record, and was the result of significant rain storms. It rained almost every day in November. October 2009 and September 2010 set new low mean monthly flows for the period of record. Although both October, 2009 and September 2010 had some significant rain, they are historically the highest flow months (October is the highest and September is the second highest).

Records of water temperature are considered fair for the period as recorder corrections were not consistent varying 3.2°F during 3 visits. Water temperatures were checked against mean stream temperatures by 3 cross – sectional measurements and the minimum recorded water temperature was 32.0°F using the field corrections. Water temperature records are complete October 1, 2009 – September 23, 2010.